WHITEWATER SUBDIVISION (PWS 6030058)
SOURCE WATER ASSESSMENT FINAL REPORT

May 6, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for the Whitewater Subdivision, Chubbuck, Idaho* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories, inorganic contaminants (IOCs, i.e. nitrates, arsenic), volatile organic contaminants (VOCs, i.e. petroleum products), synthetic organic contaminants (SOCs, i.e. pesticides), and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

The Whitewater Subdivision (Public Water System 6030058) drinking water system currently consists of two well sources: Well #1 and Well #2. The wells are located north of the City of Chubbuck near Interstate 15. Water from the wells is pumped into a single 50,000-gallon storage reservoir and then pumped to the distribution system. The public water system serves approximately 96 to 138 persons with 46 unmetered connections.

The potential contaminant sources identified within the delineated time-of-travel (TOT) zone included a major transportation corridor (Interstate 15) and a wastewater land application (WLAP) site. A complete list of potential contaminant sources is provided with this assessment.

For the assessment, a review of laboratory tests for the Whitewater Subdivision was conducted. Between July 1997 and October 2001, total coliform bacteria were detected at various locations within the distribution system. When bacteria was identified, the storage reservoir was chlorinated or a boil advisory was required. Since October 2001, there have been no total coliform detections in the system. No SOCs or VOCs have been detected in the water samples taken at the sample tap for the wells. However, there have been IOCs and radionuclides (RADs) identified. The sample location for Well #1 and Well #2 detected arsenic, barium, fluoride, sodium, gross alpha, gross beta, and nitrate between April 1985 and May 2001. All chemical results for Well #1 and Well #2 did not meet or exceed the maximum contaminant level (MCL) set by the U.S. Environmental Protection Agency (EPA) for each chemical. In February 1987, arsenic was detected at 9 micrograms per liter (µg/L), which, at the time, was below the MCL of 50 µg/L. In October 2001, the EPA lowered the arsenic MCL to 10 µg/L, giving systems until 2006 to comply with the new standard.

The nitrate history (between the years of 1985 and 2001) for the Whitewater wells show that all samples taken were below the MCL of 10.0 milligrams per liter (mg/L). Nitrate concentrations ranged from 0.79 mg/L to 4.4 mg/L with a peak concentration in May 2001. The nitrate history shows a gradual increase in nitrate levels found at the wells.

The Idaho Department of Environmental Quality (DEQ) in 1999 conducted a Sanitary Survey for the Whitewater Subdivision. The survey provides an overview and needed improvements to the public water system. Some system improvements were to remove thick brush and weeds near the wells and pump house as regular maintenance. The wells casing height should be extended at least 12 inches above the ground. The wells should have proper ventilation. Repairs should be made to leaking pump house valves to prevent rusting and deterioration. The pump house should have a proper drain to prevent damage that may result from surface water flooding. The inner sidewall of the pump house should be repaired to prevent dusts, insects and animals from entering.

The susceptibility ratings for the Whitewater Subdivision drinking water system were based upon available information relating to soil drainage characteristics, agricultural land use, system construction, and potential contaminant sources identified within each well's zones of contribution. The final susceptibility ranking for Well #1 and Well #2 were rated moderate for IOCs, VOCs, SOCs, and microbial contaminants.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Whitewater Subdivision, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). There should be no application or storage of herbicides, pesticides, or other chemicals within 50 feet of a public water system well. Another protective measure would be to limit the use of roads that pass within 50 feet of a well. The system should continue their efforts to keep the distribution system free of microbial contamination. Any new sources that could be considered potential contaminants that reside within a well's zones of contribution should be investigated and monitored to evaluate the threat of contamination the source may pose in the future. Land uses within most of the source water assessment area are outside the direct jurisdiction of the Whitewater Subdivision. Therefore partnerships with state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation encompasses much urban and commercial land uses. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Bannock County Soil and Water Conversation District. As major transportation corridors that intersect the delineation (such as Interstate 15), the Idaho Department of Transportation should be involved in protection efforts. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR WHITEWATER SUBDIVISION, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are contained in this report. The list of significant potential contaminant source categories and their rankings used to develop this assessment is also attached.

Background

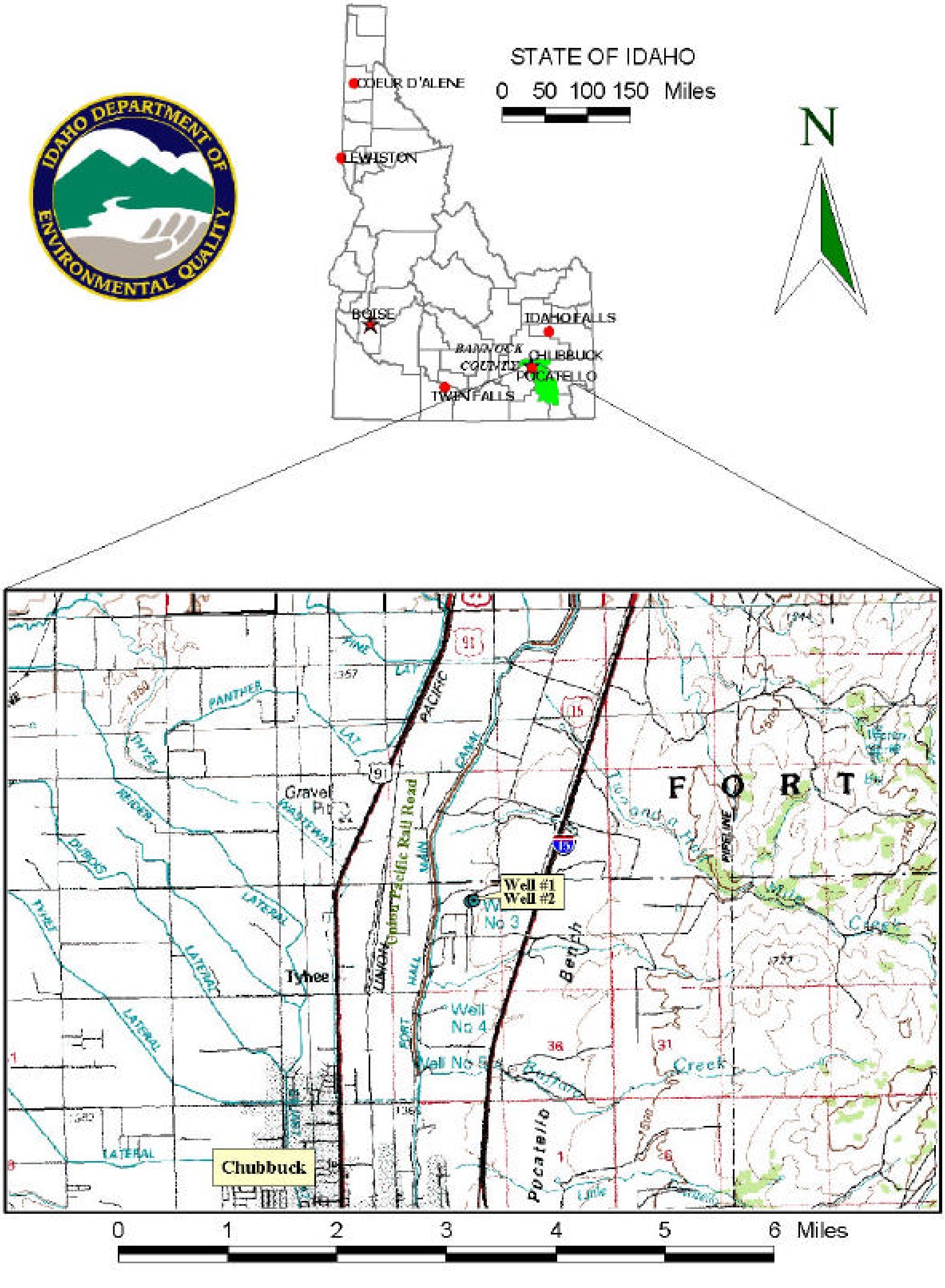
Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The information necessary to develop a drinking water protection program should be determined by the local community and be based upon its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

FIGURE 1 - Geographic Location of Whitewater Subdivision, PWS 6030058, Well #1 & Well #2



Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Whitewater Subdivision is a community public drinking water system located in Bannock County.

It is approximately 3 miles north of the City of Chubbuck and east of Tyhee (Figure 1). This system currently has two well sources that serve about 96 to 138 persons with 46 unmetered connections. At this time, there appears to be no primary water quality issues associated with the system.

A review of the Whitewater Subdivision water chemistry history was conducted using the Idaho Drinking Water Information Management System (DWIMS), the State Drinking Water Information System (SDWIS), and hardcopy laboratory results. No synthetic organic contaminants (SOCs) or volatile organic contaminants (VOCs) were detected in the water samples taken from the public drinking water wells. However, inorganic contaminants (IOCs), and radionuclides (RADs) were detected in the wells but were below the maximum contaminant level (MCL) set by the EPA.

Well #1, the primary well, is located approximately 100 feet southwest of the pump house. Well #2 is the secondary well and is located approximately 200 feet to the southeast of the pump house. Well #2 is operated during peak demand periods (July and August). Refer to Figure 2 for well locations. Water is pump from the wells into a storage reservoir. The sample location for Well #1 and Well #2 detected arsenic, barium, fluoride, sodium, gross alpha, gross beta, and nitrate between April 1985 and May 2001. All chemical results for Well #1 and Well #2 did not meet or exceed the MCL set by the EPA for each chemical. In February 1987, arsenic was detected at 9 micrograms per liter (µg/L), which, at the time, was below the MCL of 50 µg/L. Arsenic has not been detected in the system since. In October 2001, the EPA lowered the arsenic MCL to 10 µg/L, giving systems until 2006 to comply with the new standard.

The nitrate history (between the years of 1985 and 2001) for the Whitewater wells show that all samples taken were below the MCL of 10.0 milligrams per liter (mg/L). Nitrate concentrations ranged from 0.79 mg/L to 4.4 mg/L with a peak concentration in May 2001. The nitrate history shows a gradual increase in nitrate levels found at the wells (Refer to Appendix B – Whitewater Subdivision Nitrate Chart)

Additionally, there have been detects of total coliform bacteria within the distribution system, but no bacterial contamination has been found at the wellheads. Once bacterial contamination was identified, the system chlorinated the storage reservoir and/or a boil advisory was required.

Defining the Zones of Contribution--Delineation

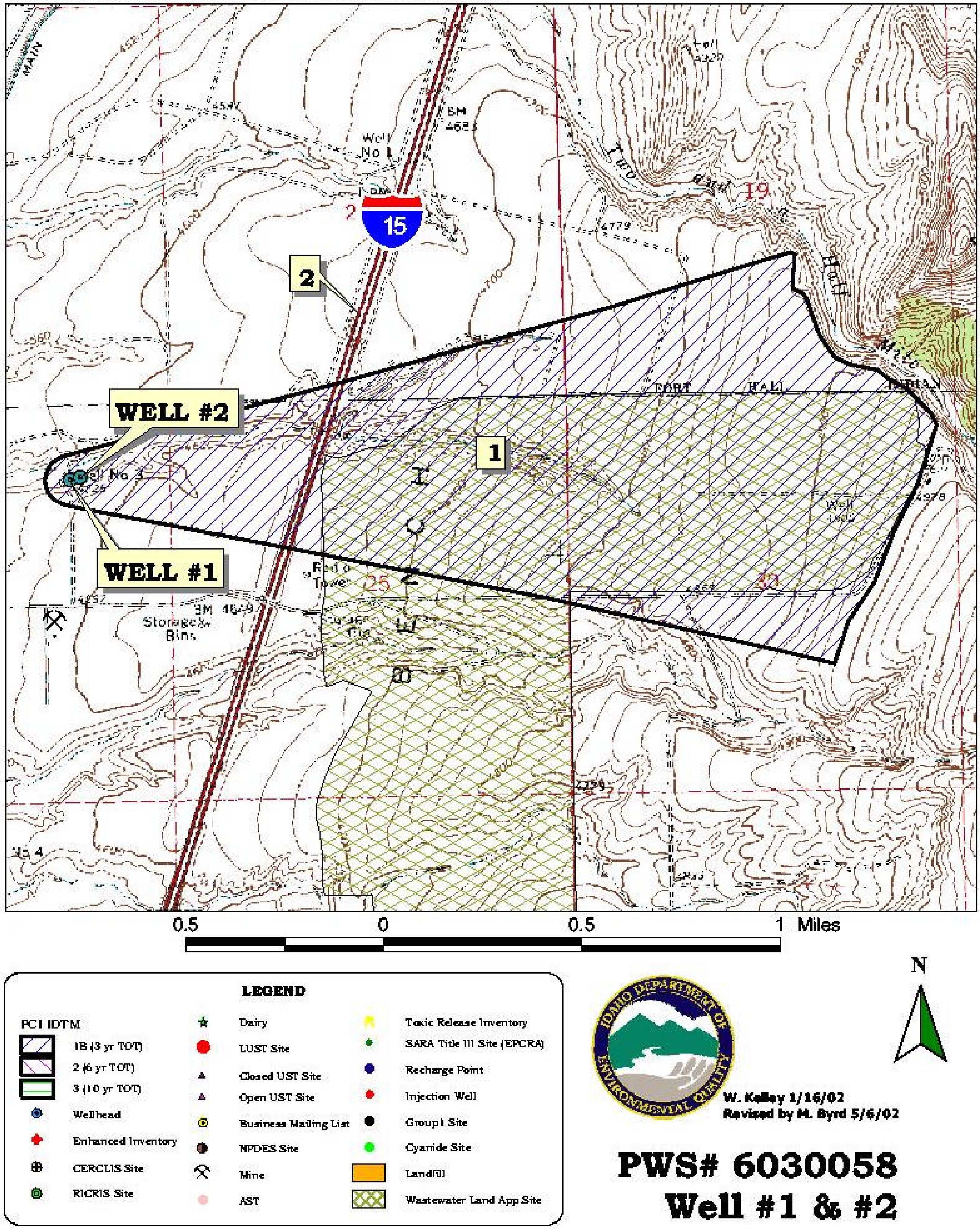
The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel zones (zones indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the public water system's zones of contribution. WGI used a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) Time-of-Travel (TOT) for water associated with the East Margin Area of the Eastern Snake River Plain (ESRP) hydrologic province. The Whitewater Subdivision falls within this hydrologic province. The computer model was assimilated by the WGI using site specific data from a variety of sources including nearby well logs, operator records, and hydrogeologic reports. Although there are two drinking water wells associated with this system, the delineation in this assessment represents both wells based upon similarities in hydrogeologic characteristics. A summary of the hydrogeologic information from the WGI Source Area Delineation Report is provided below.

The East Margin Area encompasses 821 square miles, representing approximately 8 percent of the total area of the ESRP hydrologic province. The majority of the East Margin Area is within Bingham County, with small areas occurring in Bannock, Bonneville, and Power counties.

The regional ESRP aquifer is the most significant aquifer in the East Margin Area and consists primarily of basalt of the Quaternary-aged Snake River Group. However, additional water-bearing units are used for water supply along the margin of the ESRP. In order of decreasing age, the most significant aquifers in the Michaud Flats area are bedded rhyolite (volcanic rock) of the Tertiary-aged Starlight Formation and Quaternary-aged pediment gravels formed by running water, basalt of the Big Hole Formation, and stream deposits of the Sunbeam Formation (see Jacobson, 1982, p. 7, and Corbett, et al., 1980, pp. 6-10). A few shallow domestic wells in the central Michaud Flats area also are completed in Michaud Gravel, which is the shallow water-table aquifer. The American Falls Lake Beds Formation (AFLB) confines the deeper aquifers and averages 80 feet in thickness in the central Michaud Flats area (Jacobson, 1984, p. 6). The AFLB pinches out in the eastern Michaud Flats area near the Portneuf River, effectively combining the shallow and deep stream deposits into a single water table aquifer (Bechtel, 1994, p. 2-2). Other aquifers in the East Margin Area include fractured quartzite that has been developed near Blackfoot, stream deposits near the cities of Firth and Basalt, and pediment gravels in the Gibson Terrace area near Tyhee and Chubbuck.

Public water system (PWS) wells in the East Margin Area of the ESRP province produce water from five different aquifers: the Regional Eastern Snake River Plain aquifer, three alluvial (or stream deposited) aquifers (Eastern Michaud Flats, Firth/Basalt, and Gibson Terrace/Pocatello Bench) and a quartzite aquifer (Blackfoot). The conceptual model for the Regional Eastern Snake River Plain Aquifer in which the Whitewater Subdivision public water system resides is presented below.

FIGURE 2 - Whitewater Subdivision Delineation Map and Potential Contaminant Source Locations



Regional Eastern Snake River Plain Aquifer

The ESRP is a northeast trending basin located in southeastern Idaho. The 10,000 square miles of the plain are primarily filled with highly fractured layered Quaternary-aged basalt flows of the Snake River Group, which are between layers of rocks formed by sediment deposition along the margins (Garabedian, 1992, p. 5). Quaternary-aged basalts are estimated to be 100 to 1,500 feet thick, with the majority of the area in the range of 100 to 500 feet thick (Whitehead, 1992, Plate 3). Individual basalt flows range from 10 to 50 feet thick, averaging 20 to 25 feet thick (Lindholm, 1996, p. 14). Basalt is thickest in the central part of the eastern plain and thins toward the margins. Whitehead (1992, p. 9) estimates the total thickness of the flows to be as great as 5,000 feet. A thin layer (0 to 100 feet) of windblown and stream-produced sediments overlies the basalt. The plain is bounded on the northeast by rocks of the Yellowstone Group (mainly rhyolite) and Idavada Volcanics to the southwest. These rocks may also underlie the plain (Garabedian, 1992, p. 5). Granite of the Idaho batholith borders the plain to the northwest, along with sedimentary rocks and metamorphic rocks (altered by heat and/or pressure) (Cosgrove et al., 1999, p. 10). The Snake River flows along part of the southern boundary and is the only drainage that leaves the plain. A high degree of connectivity with the regional aquifer system is displayed over much of the river as it passes through the plain. However, some reaches are believed to be perched or separated from the main ground water by unsaturated rock, such as the Lewisville-to-Shelly reach. Rivers and streams entering the plain from the south are tributary to the Snake River. With the exception of the Big and Little Wood rivers, rivers entering from the north vanish into the basalts of the Snake River Plain aquifer that have a higher ability to transmit water.

The layered basalts of the Snake River Group host one of the most productive aquifers in the United States. The aquifer is generally considered unconfined, yet may be confined locally because of interbedded clay and dense unfractured basalt (Whitehead, 1992, p. 26). Whitehead (1992, p. 22) and Lindholm (1996, p.1) report that well yields of 2,000 to 3,000 gal/min are common for wells open to less than 100 feet of the aquifer. Transmissivities obtained from test data in the upper 100 to 200 feet of the aquifer range from less than 0.1 ft^2/sec to 56 ft^2/sec (1.0×10^4 to 4.8×10^6 ft^2/day; Garabedian, 1992, p. 11, and Lindholm, 1996, p. 18). Lindholm (1996, p. 18) estimates aquifer thickness to range from 100 feet near the plain's margin to thousands of feet near the center. Models of the regional aquifer have used values ranging from 200 to 3,000 feet to represent aquifer thickness (Cosgrove et al., 1999, p.15).

Regional ground water flow is to the southwest paralleling the basin (Cosgrove et al., 1999; deSonneville, 1972, p. 78; Garabedian, 1992, p. 48; and Lindholm, 1996, p. 23). Reported water table gradients range from 3 to 100 ft/mile and average 12 ft/mile (Lindholm, 1996, p. 22). Gradients steepen at the plain's margin and at discharge locations. The estimated effective ratio of the rock's open space volume to its total volume range from 0.04 to more than 0.25 (Ackerman, 1995, p.1, and Lindholm, 1996, p. 16).

The majority of aquifer recharge results from surface water irrigation activities (incidental recharge), which divert water from the Snake River and its tributaries (Ackerman, 1995, p. 4, and Garabedian, 1992, p. 11) and locally from canal leakage. Natural recharge occurs through stream losses, direct precipitation, and tributary basin underflow.

Aquifer discharge occurs primarily as seeps and springs on the northern wall of the Snake River canyon near Thousand Springs and near American Falls and Blackfoot (Garabedian, 1992, p. 17). To a lesser degree, discharge also occurs through pumping and underflow.

The East Margin Area is among the most transmissive regions of the regional aquifer, therefore it has a higher ability to transmit water. A transmissivity of 21 ft^2/sec was used to represent the upper 200 feet of the regional aquifer in the East Margin Area in the three-dimensional USGS ground water flow model (Garabedian, 1992, Plate 6). The equivalent hydraulic conductivity or the rate at which water can move through permeable material is 9,072 ft/day. This value is consistent with the range of hydraulic conductivity, the rate water flows through a cross section, (9,500 to 11,708 ft/day) calculated using data from a constant-rate aquifer test conducted in 1981 (Jacobson, 1982, p. 23). This range was calculated by dividing the estimated transmissivity (228,000 to 281,000 ft^2/day) by the perforated interval of the observation well (24 feet). The geometric mean hydraulic conductivity based on analysis of specific capacity data from PWS wells (135 ft/day) is significantly lower.

A published water table map of the Upper Snake River Basin (IDWR, 1997, p. 9) indicates that the ground water flow direction in the ESRP aquifer in the East Margin Area is similar to that depicted at the regional scale (e.g., Garabedian, 1992, Plate 4).

Recharge from precipitation and surface water irrigation in the East Margin Area ranges from less than 10 to more than 20 inches per year (Garabedian,1992, Plate 8). The low end of the range applies to the area near Blackfoot, while the high end applies to the area on the west side of American Falls Reservoir near Aberdeen.

Kjelstrom (1995, p. 13) reports an annual river loss of 280,000 acre-feet to the regional basalt aquifer for the 27.5-mile Lewisville-to-Shelley reach of the Snake River and 110,000 acre-feet for the 23.5-mile Shelley-to-Blackfoot reach. Annual river gains of 1,900,000 acre-feet for the 36.6-mile Blackfoot-to-Neeley reach are also estimated (Kjelstrom, 1995, p. 13). A seepage study conducted in the fall of 1980 on the Portneuf River showed a gain of about 560 ft^3/sec (405,691 acre-feet) for the 13-mile Pocatello-to-American Falls Reservoir reach (Jacobson, 1982, p. 16). The average flow in the Blackfoot River near the city of Blackfoot is low at Station #13068500 (5.2 cfs; USGS, 2001) compared to the flow in the Snake River near the city of Blackfoot at Station #13069500 (2,900 cfs; USGS, 2001).

The delineated source water assessment area for the Whitewater drinking water wells trends in a easterly direction and is conical in shape. The delineation includes only a 3-year TOT and excludes the 6- and 10-year TOT capture zones because the aquifer extent terminates at the mountains to the east. The capture zones for the wells within the Regional Eastern Snake River Plain Aquifer have a maximum length of 33 miles (WGI 2001, p. 18). The delineation for the Whitewater Subdivision wells is approximately 2.5 miles in length with the narrowest area near the wellhead locations is approximately 700 feet wide. The widest area of the delineation near Two and A Half Mile Creek against the east bench is approximately 1 mile (Figure 2). The actual data used by WGI in determining the source water assessment delineation are available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

The predominant land use for the Whitewater Subdivision is irrigated agricultural land.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted during 2001-2002. The first phase involved identifying and documenting potential contaminant sources within the Whitewater Subdivision source water assessment area through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to validate the sources identified in phase one and to add any additional potential sources in the area. This task was undertaken with the assistance of Mr. Russ Hansen with the Whitewater Subdivision Water System. At the time of the enhanced inventory, no additional potential contaminant sources were found within the delineated source water area. Figures with well locations, delineated areas, and potential contaminant sources are provided with this report (Figure 2). Each potential contaminant source has been given a unique site number that references tabular information associated with the public water well (Table 2).

Potential contaminant sources were found within the 3-year TOT zone. The major transportation corridor, Interstate 15 is located east of the wells. Major transportation corridors could potentially contaminate the ground water through herbicide usage and by accidental spills or releases. There is also a municipal waste water land application (WLAP) site east of Interstate 15. The WLAP site is potentially a non-point source for inorganic and microbial contaminants. Contaminants of potential concern should be outside of the wellhead's sanitary setback (50-foot radius around the wellhead) to provide additional protection for the well. Refer to Table 2 for the complete list of potential contaminant sources. For locations of wells, delineation and potential contaminant sources refer to Figure 2.

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for a well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix A contains a susceptibility analysis worksheet for each well in the assessment. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors. These factors are surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the water producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet from the surface protect the ground water from contamination.

Hydrologic sensitivity was rated moderate for Well #1 and Well #2 (Table 3). This is based upon regional soil classifications as moderate to well drained. Soils with poor to moderate drainage characteristics are thought to have better filtration capabilities than faster draining soils. The subsurface material for Well #2 is composed predominantly of yellow clay with layers of gravel, brown clay, and sand with gravel. Well #1 subsurface material consists of clay near the surface with sand, gravel and soft sandstone below. Vadose zone materials comprised of gravel or fractured rock will provide less protection from contamination than finer-grained sedimentary materials. The depth to first ground water for both Well #1 and Well #2 is less than 300 feet from the surface. With all factors equal, water taken from a greater ground water depth will result in contaminant reduction through absorption and/or other dispersion mechanisms (Idaho Source Water Assessment Plan, October 1999, p. E-59). Both Well #1 and Well #2 have a 50-foot thick fine-grained zone to provide a barrier that will help reduce the downward movement of contaminants.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system that can better protect the water. If the casing and annular seal both extend into a low permeability unit then the possibility of cross contamination from other aquifer layers is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capabilities. When information was adequate, a determination was made as to whether the casing and annular seals extend into low permeability units and whether current public water system (PWS) construction standards are met.

Well driller's logs were available for the Whitewater Subdivision Well #1 and Well #2.

The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems (PWSs) to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within consolidated material or 18 feet below the surface, the thickness of the casing, etc. Pump tests for wells producing greater than 50 gallons per minute (gpm) require a minimum of a 6-hour test. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards.

The system construction scores were rated moderate for Well #1 and Well #2. The wellheads and surface seals are considered maintained and in acceptable condition. It is unknown whether the wells are vented (DEQ Sanitary Survey, 1999). According to the well log for Well #1, the annular seal is placed to 18 feet below ground surface (bgs) into clay, and the casing extends into "layers of sand and gravel." For Well #2, the annular seal for 25 feet bgs extending into "yellow clay," with the casing extending to "hard red sandstone." When the well casing extends into a low permeable material, such as clay, it decreases the well's susceptibility to laterally migrating contamination. The casing thickness for both wells is less than the recommended thickness for a public drinking water well. Well #1 has an 8-inch casing diameter. It is recommended to have a casing thickness of 0.322-inch for an 8-inch casing diameter. Well #2 has a 12-inch casing diameter and should have a 0.375-inch casing thickness. A thicker casing may prolong the life of the well. When Well #2 was drilled, a pump test was conducted and met DEQ requirements. There was no pump test conducted for Well #1. Well log data for both wells shows the highest water producing zone is at least 100 feet below static water level. When water is drawn from deeper levels of the aquifer, it may provide a buffer from contaminants. Both wells are located outside of a 100-year floodplain. This may decrease the chance of contaminants being drawn into the drinking water source from surface water flooding. Protection from surface water flooding is highly dependent on proper well and well house construction. Both Well #1 and Well #2 are unhoused and may be susceptible to surface water flooding. The wells lack the required sanitary setback (50-feet radius) around the wellhead. A sanitary setback is important to prevent direct access to the wells and reduce the risk of contamination. A Summary of Whitewater Well Construction information has been provided with this assessment (Table 1).

Table 1. Well Construction Summary for the Whitewater Subdivision

Well	Depth (feet)	Casing Diameter (inch)	Casing Thickness (inch)	Casing Depth (feet)	Static Water Level Below land surface (feet)	Screened Interval (feet)	Surface Seal Depth (feet)	Year Drilled	IDWR Standards Met?
1	331	8	.250	277	120	None	18	1979	No
2	370	12	.250	310	120	None	25	1986	No

Potential Contaminant Source and Land Use

The potential contaminant sources and land use within the delineated zones of water contribution are assessed to determine each well's susceptibility. When agriculture is the predominant land use in the area, this may increase the likelihood of agricultural wastewater infiltrating the ground water system. Agricultural land is counted as a source of leachable contaminants and points are assigned to this rating based on the percentage of agricultural land. The land use in this area is considered irrigated cropland.

In terms of potential contaminant sources and land use susceptibility, Well #1 and Well #2 rated moderate for IOCs (i.e., nitrates), and low for VOCs (i.e. petroleum related products), SOCs (i.e., pesticides) and microbial contaminants (i.e., fecal coliform). Refer to Table 2 for potential contaminant inventory.

Table 2. Whitewater SubdivisionWell #1 and Well #2 Potential Contaminant Inventory.

TOT Zone (years)[1]	Site Number(s)	Source(s) Description	Source(s) Information	Potential Contaminants[2]
0-3	1	Wastewater Land Application Site	Database/Enhanced Inventory	IOC, Microbials
0-3	2	Major Transportation Corridor – Interstate 15	GIS Map	IOC, VOC, SOC, Microbials

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Final Susceptibility Rating

A detection above a drinking water standard (MCL), any detection of a VOC or SOC, or having potential contaminant sources within 50 feet of the wellhead will automatically give a high susceptibility rating to the final well ranking despite the land use of the area because a pathway for contamination already exists. If potential contaminant sources are within 50 feet of a wellhead, this will automatically lead to a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) and a large percentage of agricultural land contribute greatly to the overall ranking. The final susceptibility rankings are: Well #1 and Well #2 are moderate for IOC, VOC, SOC and microbial contaminants. These ratings reflect the hydrologic sensitivity, system construction, and potential contaminants inventory and land use within the delineated source water assessment areas for the Whitewater Subdivision wells. Refer to Table 3 for the Susceptibility Analysis Summary.

Table 3. Summary of Whitewater Subdivision Susceptibility Analysis

	Susceptibility Scores									
	Hydrologic Sensitivity	Contaminant[1] Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	M	L	L	L	M	M	M	M	M
Well #2	M	M	L	L	L	M	M	M	M	M

H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility; [1]IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

The IOCs (arsenic, barium, fluoride, nitrate, sodium) and RADs (Gross Alpha, Gross Beta) represent the main water chemistry recorded for the Whitewater Subdivision public water system. The reported concentrations of these chemicals were below the MCL for each chemical. All water chemistry tests for the Whitewater Subdivision wells have not detected VOCs and SOCs. Although there was a detection in February 1987 for arsenic, it was below the MCL of 50 µg/L. In October 2001, the EPA lowered the arsenic MCL to 10 µg/L, giving systems until 2006 to comply with the new standard. The nitrate levels in the Whitewater Subdivision wells are approaching the active level (meets or exceeds half the MCL). If nitrate levels continue to increase the system will need to look into methods to reduce the nitrate concentrations.

Total coliform bacteria were detected at various locations within the distribution system. When bacteria was identified, the storage reservoir was chlorinated or a boil advisory was required. Since October 2001, there have been no total coliform detections in the system.

In this area, the county level nitrogen fertilizer use is considered low, and the herbicide use and overall agriculture-chemical use is moderate due to a amount of agricultural land. Although there may only be a small portion of agriculture land in the direct vicinity of the wellheads, it is useful as a tool in determining the overall chemical usage such as pesticides and how it may impact ground water through infiltration and surface water runoff. Potential contaminant sources were identified within the wells 3-year TOT delineated capture zone and were documented (Figure 2 and Table 2).

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For drinking water protection, the Whitewater Subdivision should focus on correcting any deficiencies that were outlined in the sanitary survey. The wellheads need to be properly maintained and protected. Protection includes no application or storage of herbicides, pesticides or other chemicals within 50 feet from the wellhead. Limiting road access near wellheads can reduce the potential for contamination from spills or releases. If microbial contamination becomes a concern, the system should take appropriate measures to disinfect the system. If IOC levels continue to increase, the system should investigate remediation options such as reverse osmosis. Once drinking water wells are protected, the system can focus on documenting types and locations of potential contaminant sources. These potential contaminant sources can be point sources, such as a new gas station, or non-point sources, such as storm water runoff. Any new sources that may be considered potential contaminants should be investigated and if need be monitored to prevent future contamination. Land uses within the area should also be evaluated. Areas with higher than normal agricultural land use may have increases in agricultural wastewater runoff that could infiltrate the ground water. Land uses within most of the source water assessment area are outside the direct jurisdiction of the Whitewater Subdivision. Therefore partnerships with state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation encompasses much urban and commercial land uses. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Bannock County Soil and Water Conversation District. As major transportation corridors intersect the delineation (such as Interstate 15), the Idaho Department of Transportation should be involved in protection efforts. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

A community system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning ordinances) or non-regulatory (i.e. public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

DEQ Pocatello Regional Office (208) 236-6160

DEQ State Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, Idaho Rural Water Association, at 208-343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

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POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as A Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Appendix A

Whitewater Subdivision Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.273)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report   Public Water System Name : WHITEWATER SUBD   Well# : WELL #1
Public Water System Number 6030058   4/25/02 11:49:38 PM

1. System Construction

		SCORE
Drill Date	8/10/79	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1999
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	NO	1
Total System Construction Score		4

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		3

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	2	1	1	2
(Score = # Sources X 2) 8 Points Maximum		4	2	2	4
Sources of Class II or III leacheable contaminants or	YES	6	1	1	
4 Points Maximum		4	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	7	7	8
Cumulative Potential Contaminant / Land Use Score		16	9	9	10

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	11	9	9	11
5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report   Public Water System Name : WHITEWATER SUBD   Well# : WELL #2

Public Water System Number 6030058   4/25/02 11:49:38 PM

1. System Construction

		SCORE
Drill Date	8/26/86	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1999
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	YES	0
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	NO	1
Total System Construction Score		2

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		3

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	2	1	1	2
(Score = # Sources X 2) 8 Points Maximum		4	2	2	4
Sources of Class II or III leacheable contaminants or	YES	6	1	1	
4 Points Maximum		4	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	7	7	8
Cumulative Potential Contaminant / Land Use Score		16	9	9	10

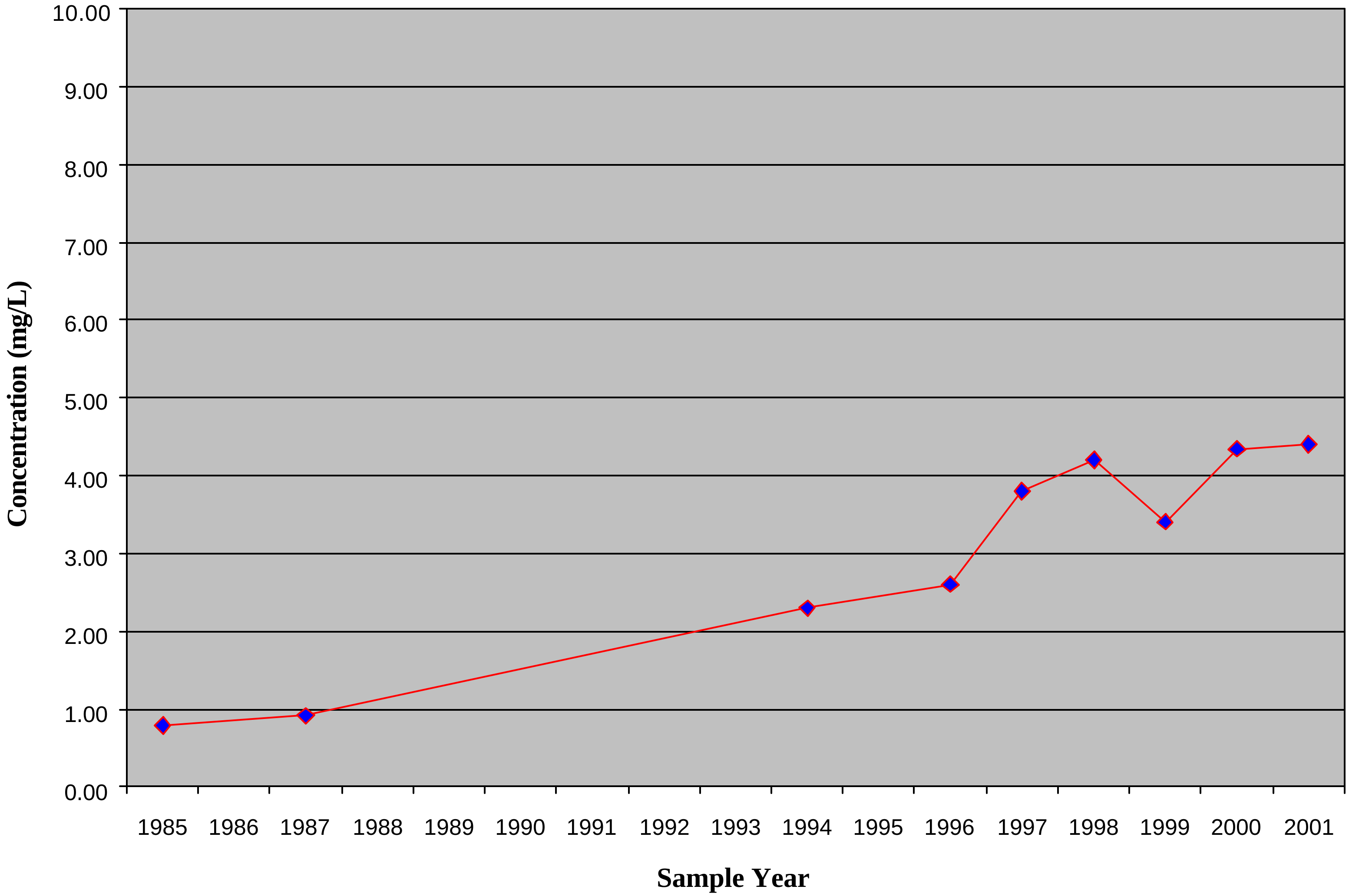
4. Final Susceptibility Source Score

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	9	7	7	9
5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate

Appendix B

Whitewater Subdivision
Nitrate Chart

Whitewater Subdivision Nitrate Sampling History
PWS 6030058



- Data from State Drinking Water Information System (SDWIS)
  Created: April 25, 2002
  Nitrate Maximum Contaminant Level is 10 mg/L